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ABSTRACT

CREATING AND OPERATING AN EFFICIENT TRANSPORTATION SYSTEM IN THE 1970'S WILL GENERATE EMPLOYMENT FOR 14 MILLION PERSONS IN ALL OCCUPATIONS. AS TRANSPORTATION METHODS BECOME MORE SOPHISTICATED, SO WILL THE SKILLS REQUIRED OF THOSE WHO WORK IN THAT FIELD, AND VOCATIONAL TECHNICAL EDUCATION MUST PLAN FOR PRESENT NEEDS AND FUTURE DEVELOPMENTS. SECONDARY SCHOOLS NEED TO EDUCATE, TRAIN AND GUIDE MORE DISADVANTAGED YOUNG PERSONS TO ENTER THE SKILLED AND SEMI-SKILLED BLUE COLLAR OCCUPATIONS OF THE TRANSPORTATION WORK FORCE. TO MEET THIS CHALLENGE, VOCATIONAL EDUCATION NEEDS COOPERATIVE WORK-STUDY PROGRAMS, STRONG VOCATIONAL COUNSELING AND PLACEMENT PROGRAMS, AND EXPANSION OF JUNIOR AND COMMUNITY COLLEGE PROGRAMS AND GENERAL VOCATIONAL-TECHNICAL EDUCATION PROGRAMS. (CD)

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The Implications of Job Opportunities in Transportation for Priorities in Vocational-Technical Education

Working Paper

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INTRODUCTION

The present transportation system in the United States is essentially a dual economy. The largest element is made up of individual consumers with their preference for private automobiles. The other is composed of carriers moving people and freight by airplane, bus, and railroad. Creating and operating an efficient and progressive transportation system in the 1970's is expected to generate employment for 14 million persons in all occupations. Job openings in the occupations which are unique to transportation are likely to average close to 300,000 a year.

Blue collar workers make up more than two-thirds of employment associated with transportation, and semi-skilled workers account for over two-fifths of the total. This is a significant fact in an economy whose employment pattern has increasingly come to be characterized by the white collar and service fields. Many of the career opportunities in transportation in the next ten years will come about because of job openings for skilled workers such as airplane and automobile mechanics. The vocational-technical education system, for example, will figure as the nation's largest single source of training for the 50,000 openings expected to develop each year for automobile mechanics. There will be even more job opportunities for semi-skilled workers, including many truckdrivers and delivery and routemen. Both the skilled and less skilled blue collar jobs in transportation offer broad scope for enhancing the employability, earnings, and work satisfaction of

young persons in the disadvantaged groups in American society.

Technological changes affecting transportation in the 1970's can be expected to create new occupations and to alter the job content and earnings in many of the present fields of employment. Widespread utilization of hydrofoils and air cushion vehicles, to cite instances, would develop new occupations whose job content would combine elements of the duties of airplane pilots and mechanics with those of the personnel of ship crews. Widespread use of high speed intercity passenger trains such as the ones currently in service between Washington, D.C. and New York would bring about greater-than-anticipated opportunities in railroad transportation, and it would place heavy emphasis on familiarity with electronic equipment.

Planning in vocational-technical education directed at the transportation occupations in the 1970's will include provision for upgrading and expanding skill training. It will also include measures to encourage the development of cooperative work-study programs, and to provide a greater role for vocational education as general education and occupational orientation for students with limited verbal skills. Anticipating the mass of job openings growing out of the preponderant role of the automobile in the transport economy, while also preparing young persons for careers in commercial transportation will provide a major challenge in relating vocational-technical education to the career opportunities which will emerge in transportation five, ten, or fifteen years from now.

PATTERNS OF EMPLOYMENT GROWTH IN TRANSPORTATION

Employment requirements in transportation grow out of the forces which have been changing the transportation economy in the past two decades. They reflect shifts in the distribution of traffic between different modes, technological advances, rising income levels for most American families, and the concentration of metropolitan population growth in the suburbs. The overall impact of these forces for career opportunities can be illustrated with reference to the recent changes in the importance of the individual transport modes.

The fastest growing areas of employment linked with transportation in the past twenty years have been in occupations associated with automobile service and air travel. Since World War II, automobile and air travel have replaced railroads as the primary means of intercity passenger travel. Currently, the airlines are responsible for nearly as large a percentage of the intercity passenger traffic as the railroads and busses combined. Similarly, trucking companies have come to move a large part of the freight which was formerly shipped by rail. Largely because of the intense competitive pressures of their rivals, employment on the railroads declined by over half in the two decades after World War II. In this same period other transport modes such as busses, taxis, pipelines, and water transportation have also registered declines in employment. With these declines partially offsetting the large gains in employment related to automobiles, trucks, and air travel, the total growth ir employment in transportation has lagged behind the overall growth in

civilian employment. In the past two decades the increase in transportation was about 20 percent compared to 25 percent for total civilian employment.(1)

Marked differences in the growth prospects for different types of transportation are also likely to characterize the 1970's. The predominance of the automobile is likely to continue, and, perhaps, to increase. For example, as family incomes come to exceed the $10,000 average expected in the mid-1970's (in dollars of 1964 purchasing power), it is anticipated that more than two-fifths of American families will own two or more cars.(2) So, about 70 percent of the projected transportation employment in the 1970's will be associated with the manufacture and use of motor vehicles, very largely automobiles and trucks. Rapid growth in the number of automobiles and trucks can be expected, in turn, to increase employment in highway construction and maintenance.

By 1975, commercial passenger travel by air within the United States is projected to exceed the combined travel by bus, rail, and inland waterways by over half.(3) Travel abroad by Americans will add to this massive expansion in air travel. Rapid growth is also anticipated for air cargo traffic, since air freight shipments offer substantial advantages to firms seeking to expand sales and minimize inventory costs by developing one-or two-day factory to retail outlet deliveries. Accordingly, the largest percentage increases in employment in transportation will take place in the occupations associated with air travel.

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(1) Transportation Association of America, Transportation Facts and Trends, April, 1968, pp. 14, 19.

(2) Lecht, Leonard A., Goals, Priorities, and Dollars - the Next Decade, The Free Press, 1966, p. 173.

(3) Ibid., p. 169.

Employment in the other established transport modes is expected to grow considerably more slowly than is the case for automobile and air travel. The workforce in railroad transportation, the largest of these other modes, is likely to stabilize at slightly above the level of the mid-1960's, a sharp contrast with the experience in the two decades following World War II. Only slight increases are anticipated in employment on oil pipelines, ships, and other types of transportation.

Continuation of a high priority for transportation in our society is estimated to generate employment for as many as 14 million persons in the mid-1970's in producing transportation equipment and facilities, and in operating and maintaining the transportation system. This compares with over 9 million a decade earlier.(4) These totals include occupations which are specifically associated with transportation such as airplane pilots, auto mechanics, and bus drivers, and they also include occupations which are common to many areas such as salesmen, factory operatives, and secretaries. Something less than half of all employment in the field is represented by the occupations which are unique to transportation, the jobs related to transportation operations and maintenance. They are the areas which can be expected to figure in program planning for transportation by the vocational education system. The anticipated employment and job openings in the major occupations associated with motor vehicle operations, air transportation, and railroad transport are summarized in Table 1 on the following page.

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(4) Lecht, Leonard A., Manpower Needs for National Goals in the 1970's, Praeger, 1969, p. 95.

Table 1

Estimated Employment and Annual Average Job Openings
in Selected Transportation Occupations, 1966 and 1975

Occupation	Employment (in 000) 1966	Employment (in 000) 1975	Average Annual Job Openings 1966 to 1975(a)
Motor Vehicle Occupations	3,745	5,742	258,400
Auto Mechanics & Repairmen	784	1,159	50,100
Auto Service & Parking Attendants	394	768	43,200
Bus Drivers	197	220	4,800
Deliverymen & Routemen	579	1,138	67,900
Taxidrivers & Chauffeurs	156	194	6,200
Truck & Tractor Drivers	1,635	2,263	86,200
Air Transport Occupations	165	270	12,700
Airplane Mechanics	130	199	8,600
Airplane Pilots & Navigators	35	71	4,100
Railroad Occupations	169	196	7,700
Brakemen & Switchmen	109	131	4,400
Locomotive Engineers	60	65	3,300
Total	4,079	6,208	278,800

(a) Includes job openings due to employment growth plus replacement needs due to attrition.

Sources: See Appendix Table 2.

The occupations in Table 1 cover the spectrum of skills ranging from unskilled parking lot attendants to airplane pilots. All except the pilots and navigators are blue collar fields. Four occupations related to motor vehicles are expected to account for five-sixths of the job openings in all the fields listed. They are truck and tractor drivers, deliverymen and routemen, auto mechanics and repairmen, and auto service and parking attendants. Some of the smaller occupations omitted from the table will offer promising prospects for a limited number of well-trained individuals. For example, it is estimated that 16,000 air traffic controllers will be employed in 1975.

Most of the job openings in the occupations linked with automobile and truck transportation will come about because of employment growth rather than attrition. Employment growth will be even more significant in creating job openings for airplane pilots and mechanics. While these air transport occupations are highly skilled and well-paid fields, they are expected to remain small in numbers compared with the motor vehicle occupations. The projections list six job openings for auto mechanics and repairmen, for example, for every job opening for airplane mechanics. Replacement of attrition losses will be responsible for half or more of the job openings in the railroad occupations. (See Appendix Table 2.) The slow growth anticipated in these occupations is illustrated by the projections for brakemen and switchmen and for locomotive engineers.

The estimates in Table 1 make allowance for continued technological advances in the established modes of transport. Containerization is an instance. The introduction of new modes of transport, or greater than expected technological changes in the existing modes, could create new occupations or make for more far-reaching changes in employment than those anticipated in the table.

The prospects for technological change vary widely in the different transportation industries, mainly because of the great differences in their expenditures for research and development. At one extreme, the aircraft industry, largely with government support, has been spending close to one-fourth of its revenues from sales for research and development. At the other extreme, the comparable outlays by the railroads have amounted to less than one percent of operating revenues.(5)

The major technological advances in air transportation in the 1970's are likely to include the introduction of jet planes carrying 400 or more passengers, the development of a commercially feasible supersonic air transport plane carrying 200 passengers or more, and, more speculatively, widespread use of vertical and short take-off and landing aircraft, the V/STOLS. As one indication of the potential scope of these developments, it is estimated that by 1980 between 200 and 400 supersonic air transport planes will be in commercial use in the United States.(6)

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(5) Lecht, Leonard A., Goals, Priorities, and Dollars, op. cit., p. 174. The estimates of R & D spending refer to the early 1960's.

(6) Unpublished National Planning Association study materials.

The net effect of these advances, as they occur, will be to increase air travel. Maintaining the highly complex new types of planes will be especially important in generating job opportunities for airplane mechanics. Growth in air travel would also create many openings for ground personnel, including office and administrative personnel. Other technological advances such as the automated reservation and baggage handling systems will probably make for slow growth, or actual declines, in employment opportunities for reservation clerks and baggage handlers. Far greater automation of the radar and communication equipment used in air traffic control can be expected to reduce employment in specialized fields such as radio operators and flight dispatchers.(7)

Containerization offers the most promising prospect for a revival of railroad freight transportation. By using standardized containers, a cargo may be imported by ship, unloaded on a truck, moved to a freight car and shipped to its city of destination by rail, and finally delivered by truck. Since use of standard containers reduces the differences in handling freight in different modes of transport, widespread use of containers would create a growing demand for container freight handlers, whose work skills would be readily transferable from one type of transportation to another. The growth of this occupation will depend on the pace at which the use of containers increases, and also on the degree to which union rules make it possible to transfer similar job skills from one union jurisdiction to another.

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(7) U.S. Department of Labor, Occupational Employment Patterns for 1960 and 1975, 1968, p. 52.

The heavily populated Northeast Corridor will provide a testing ground for high speed railroad passenger transportation. The survival of railroad passenger transportation, and the employment associated with it, depend largely on the outcome of this experiment in modernization. A high speed railroad passenger system linking the cities between Richmond and Boston on the East Coast, according to current estimates, would make it possible to carry up to 20,000 more railroad passengers daily at prices generally competitive with air travel.(8) Adoption of the high speed passenger trains in many parts of the nation would probably increase railroad employment to an extent greater than indicated by the projections in Table 1. It could also be expected to cause some reductions in the job openings listed for air and automobile travel, although the reductions, especially for auto travel, would represent only a minor part of the total employment linked with these transport modes.

The most significant impact for employment in the transportation industries would arise from the everyday use of automobiles powered by sources other than the internal combustion engine, that is, by steam, electricity, or, perhaps, by fuel cells. There has been considerable research and development with automobiles powered by these sources, and steam and electrical engines are now technically well developed. Much of the impetus to this experimentation grows out of the search for ways of reducing the air pollution caused by the internal combustion engine. If these innovations were to come into common use, they would markedly change the duties of auto mechanics and auto service attendants by relating them more closely to the use and repair of electrical

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(8) Ibid.

or steam equipment. While the potential of the new engines is large, there is a reasonable probability, at least for the next decade, that the automobile and petroleum industries will cope with the challenge to their investments in the existing technology by devising more effective pollution control devices which will greatly reduce, if not eliminate, the exhaust and crankcase fumes from the internal combustion engine. The adoption of these improved devices is expected to be nearly universal by 1975. The net effect of their utilization is likely to increase employment for auto mechanics with skills generally similar to those which are now required.

Innovations such as the hydrofoil or air cushion vehicles will have a considerably lesser influence on transportation employment in the 1970's than the advances in air transport or in containerized transportation. Unlike these innovations, the large-scale use of hydrofoils or ACV's is most likely to occur as a substitute for present types of transport such as ships or planes. However, both of these new transport modes are in use in some nations in Europe and elsewhere, and there are prospects for increased utilization of hydrofoils in the United States as a commercial commuting vehicle in metropolitan areas surrounded by large bodies of water. New York City or the San Francisco Bay area are instances. Air cushion vehicles - vehicles lifted above land, water, ice, or swamp surfaces by air pressure and propelled forward by turbines or propellers - offer a more speculative prospect than hydrofoils. Widespread use of hydrofoils and the ACV's would create new occupations whose job content would include elements resembling those of airplane pilots and mechanics and those of ship personnel.

Planning in vocational-technical education in the 1970's will involve anticipating the career prospects in the established types of transportation while also allowing for the less readily foreseen impacts of technological changes for job opportunities. For the next decade, most of the job openings in transportation will occur in the transport modes which are already in everyday use. As the time horizon expands, say to 1985 or 1990, the unanticipated changes arising from technological progress can reasonably be expected to increase substantially in importance as a source of job openings in transportation.

OPPORTUNITIES FOR THE DISADVANTAGED

When the transportation sector of the economy is expanding, job opportunities for individuals in the economically and socially disadvantaged groups are also improving. These groups gain by growth in transportation employment for two principal reasons. One is the predominance of blue collar job openings. The other is the relative absence of discriminatory barriers based on race in most of the large transportation occupations.

The educational and training requirements for employment in transportation reflect the occupational structure of the transportation workforce. In the mid-1970's it is anticipated that more than six blue collar workers and over four semi-skilled operatives will be employed for every professional and technical, or managerial worker. These blue collar jobs can be learned through on-the-job training, in private proprietary schools, or in vocational education courses, MDTA programs, or cooperative work-study programs. The most formidable entrance requirements in the blue collar occupations associated with transportation are in the skilled railroad operating crafts such as locomotive engineers.

The potentials for generating employment for persons in the "left out" groups in American society in transportation are illustrated by the projections for nonwhites. In 1966, nonwhites were represented in the occupations associated with motor vehicles, the largest component in transportation, in roughly their overall proportion in the civilian labor force, about 11 percent, and in some

instances their representation was greater. For example, about 15 percent of all truck and tractor drivers were nonwhites, as were close to 10 percent of the deliverymen and routemen, and over 8 percent of the auto mechanics and repairmen. By contrast, there were virtually no nonwhite locomotive engineers in 1966, and there were fewer than a thousand airplane pilots and navigators. However, the occupations in which few nonwhites are employed make up only a small proportion of the total workforce in the fields which are specific to transportation. On balance, therefore, growth in employment in transportation in the next decade can be expected to create many job openings for Negroes, Puerto Ricans, and other nonwhites. The prospects are summarized, for the occupations related to motor vehicles, in Table 2.

Table 2

Estimated Employment Opportunities for
Nonwhites in Blue Collar Motor Vehicle Occupations,
1966 and Projected 1975

Occupational Category	Number Employed (in 000)		Percent Increase, 1966 to 1975
	1966	Projected 1975	
Auto Mechanics & Repairmen	65	137	111 %
Auto Service & Parking Attendants	41	109	166
Bus Drivers	26	42	162
Deliverymen & Routemen	55	125	127
Taxi Drivers & Chauffeurs	33	53	61
Truck & Tractor Drivers	245	409	67
Total	465	875	88

Sources: Current Population Survey, op. cit., 1966, and Lecht, Leonard A., Manpower Needs for National Goals, op. cit., Table B-6, pp. 156 ff.

Close to half a million nonwhites were employed in the blue collar occupations in the motor vehicle field in 1966. This total is expected to grow to nearly 900,000, an increase of seven-eighths, by 1975. Truck and tractor drivers and auto mechanics and repairmen are estimated to provide the two largest sources of employment in both years. The increases anticipated for nonwhites in many of the fields listed in Table 2 are greater than the comparable projections for whites. Auto mechanics and repairmen are an instance. The 111 percent increase projected for nonwhites is considerably more than double the 42 percent increase for whites.

Job opportunities as auto mechanics or over-the-road truckdrivers can offer well-paid opportunities for qualified blue collar workers, white and nonwhite. Experienced over-the-road drivers frequently earned as much as $12,000 a year or more in 1966, and earnings have risen considerably since. Moreover, the physical strain and hazards in this occupation have been reduced by comfortable seating, better highways, and more stringent safety regulations. Skilled automobile mechanics and body repairmen employed by automobile dealers were paid an average hourly wage of about $4.00 an hour in 1966, excluding overtime pay.(9) Many, if not most, employers in these fields provide holiday and vacation pay, and additional benefits such as life, health, and accident insurance and, especially for unionized workers, they contribute to retirement plans.

Other jobs in transportation in which nonwhites are well represented frequently offer less attractive prospects. In 1966, many service station attendants, to cite a leading instance, were earning less than $2.00 an

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(9) The source of the information on earnings and working conditions is the Occupational Outlook Handbook, 1968-69 ed., U.S. Department of Labor.

hour. However, these positions can often serve as stepping stones to more remunerative employment. Additional training and experience can qualify service station attendants to become automobile mechanics, to move into positions as automobile parts and appliance salesmen, or, for those having business management capabilities, to become service station managers and owners.

How, and to what extent, the projections for nonwhites materialize, and especially so in the better-paid blue collar occupations, will be significantly influenced by the success of the vocational education system in reaching and teaching young persons in the disadvantaged groups. Since many of these job opportunities are located in or close to the large metropolitan centers, they offer important prospects for reducing unemployment among inner city youth, unemployment characterized by rates which have ranged between approximately 20 and 30 percent for nonwhite male teenagers in the high prosperity years since 1965.(10)

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(10) U.S. Department of Labor, Statistics on Manpower: A Supplement to the Manpower Report of the President, 1969, p. 15.

IMPLICATIONS FOR VOCATIONAL-TECHNICAL EDUCATION

This analysis of future job openings in the transportation occupations has two major implications for planning in vocational-technical education. The first concerns the readiness of the vocational educational system to meet the greater demands for skilled manpower in the transportation economy. The other involves the need for new directions in tne secondary schools, including vocational education, to educate, train, and guide more young persons from the disadvantaged groups to enter the skilled and semi-skilled blue collar occupations which make up such a large part of the transportation workforce. In serving these needs, the vocational education system will also be helping to more effectively implement the objectives of the 1968 Vocational Act Amendments.

The potentials for the vocational education system in the skilled transportation fields can be illustrated with reference to three occupations, automobile mechanics and repairmen, airplane mechanics, and airplane pilots and navigators. The relationship between the anticipated annual job openings and recent completions in the federally supported vocational education and MDTA programs are summarized in Table 3, on page 18.

It would appear from the information in the table that the vocational education system, together with MDTA, is already close to meeting requirements for automobile mechanics. This is more nearly true in this occupation than in the other two listed. However, total job openings for auto mechanics in the mid-1970's will probably exceed the 50,000 annual average attributable

Table 3

Estimated Annual Job Openings and Training Program Completions, Selected Skilled Transportation Occupations

Occupational Category	Estimated Annual Average Job Openings, 1966 to 1975	Federally-Supported Training Program Completions, Fiscal Year 1967			Training Completions as Percentage of Annual Job Openings
		Vocational Education Programs	MDTA	Total	
Auto Mechanics & Repairmen	50,100	33,300	8,100	41,400	82.5 %
Airplane Mechanics	8,600	2,300	-	2,300	26.5
Airplane Pilots & Navigators	4,100	200	-	-	0.5

Sources: See Appendix Table 3.

to employment growth and attrition over the 1966 to 1975 period.(11) Since this is an average figure for a growing occupation, job openings will be considerably above the average toward the end of the period. Many experienced auto mechanics will leave the trade to become service station managers, to open their own repair shops, or to become foremen. As many as a third of the persons completing the secondary and post-secondary vocational programs for auto mechanics are unlikely to enter this field on graduating from high school, for reasons ranging from military service to further study or training. Many graduates of the MDTA programs will seek additional on-the-job or other training in order to qualify as skilled mechanics. It is evident, accordingly, that there is still considerable need for expansion in training auto mechanics and repairmen in the vocational programs. As widespread acceptance of power steering, power brakes, and air conditioning increases the complexity of auto repairs, the need for highly skilled and frequently specialized mechanics and repairmen will generate many well-paid career opportunities for graduates of the vocational programs.

If secondary and post-secondary vocational programs preparing persons for employment as airplane mechanics remain at their current level, they will be graduating about 1 airplane mechanic for every four job openings in the 1970's. Many airplane mechanics prepare for their Federal Aviation Agency licenses by working as helpers, trainees, or apprentices, or by enrolling in courses in private vocational schools and in the armed forces. If supersonic transport planes, V/STOLS, or the giant jets are introduced on a large scale

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(11) The estimates for job openings include the openings due to employment growth and the replacement demand due to normal attrition stemming from death and retirement only.

in the coming decade, there will be some increase in the skill content of many airplane mechanics jobs and, perhaps, a greater-than-expected growth in job openings. Special adult and community college vocational programs can provide the focus for much of the expansion in programs for airplane mechanics.

Traditionally, vocational programs for mechanics in public schools, especially for auto mechanics, have been concentrated either at the secondary or the adult level. Yet there are impressive arguments for training a larger proportion of mechanics in the post-secondary programs. Courses in this area would increase the scope of the training opportunities for mechanically inclined students who wish to attend a junior or community college but who have a limited desire to pursue the standard academic program. As more airplane mechanics come to be trained in the vocational programs, and as much of automobile repair becomes a highly complex undertaking, effective job training imposes greater demands for equipment, for instruction in specialized fields such as automatic transmission and air-conditioning repair, and for an experienced highly qualified instructional staff. Programs providing this kind of training should be planned both to meet the needs of full-time students and also of part-time students who are already in the labor force. Expanding the post-secondary programs could also be important in minimizing the costly bottlenecks which would materialize if employers were to rely primarily on upgrading high school vocational programs or their own on-the-job training efforts to meet rapidly growing demands in these occupations.

Few airplane pilots or navigators are trained in the secondary or post-secondary vocational programs. Yet, in spite of the trend toward larger planes, employment in these highly skilled fields is expected to double in the 1966 to 1975 period. In addition, the major source of supply for airplane pilots and navigators in the past, the armed forces, is becoming of decreasing importance. Military separations of flight officers in the 27 to 48 age group are projected to decline from about 5,400 in 1964 to less than 3,500 in 1972.(12) In the mid-1960's, about two-fifths of these officers accepted positions with civilian employers after leaving the armed forces. In view of this decline in the supply of pilots for civilian economy purposes, it is primarily the FAA-approved training programs in two- and four-year colleges which will serve as the source of commercial pilots in the 1970's.

The vocational programs can also serve students who will enter less skilled transportation occupations such as truckdrivers or deliverymen and routemen. These jobs will be available to young people at the point of leaving school as well as to out-of-school individuals who may be underemployed, unemployed, employed in low wage occupations, or out of the labor force.

Currently, little or no training is offered by the vocational education system in the semi-skilled transportation occupations. Yet programs related to these occupations can offer an important means for utilizing the vocational curriculum to encourage students both to complete high school and also to prepare for employment. While the median number of years of schooling completed

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(12) Federal Aviation Agency, Manpower Requirements of the Civilian Aviation Industry, 1964, p. 87.

in these occupations is currently less than 12 years, the educational level in each is expected to increase in the 1970's. The increases for occupations related to motor vehicle operations are summarized in Table 4.

Table 4

Estimated Educational Attainment in Selected Motor Vehicle Occupations, 1962 and Projected 1975

Occupational Category	Average Annual Job Openings, 1962 to 1975	Median Years of School Completed	
		1962	Projected 1975
Auto Service & Parking Attendants	43,200	10.5	11.5
Bus Drivers	4,800	10.2	11.4
Deliverymen & Routemen	67,900	11.1	11.9
Taxi Drivers & Chauffeurs	6,200	9.5	10.8
Truck & Tractor Drivers	86,200	9.2	10.7

As the educational level of the employed workforce, and especially the new entrants, in these occupations rises, young persons with less schooling will be at a disadvantage in obtaining employment. Therefore, part of the rationale for vocational education in the less skilled transportation occupations will grow out of its potential to serve as general education encouraging students with limited verbal skills to complete high school. English, for example, may be learned by reading work directions for driving a truck as well as by studying the conventional textbooks. A vocationally-oriented curriculum can also provide useful information about job prospects and conditions of employment, and it can serve to inculcate appropriate work attitudes as well as skills orientation. The effectiveness of these programs would be enhanced if they were integrated

with an adequate guidance and job placement service. At present, it is primarily the college bound students who receive substantial placement help in high school. The occupational information content of the vocational programs and their role as general education, along with the guidance, may be even more important in serving students who will enter semi-skilled blue collar occupations than the specific technical content. Most of the students entering the less skilled transportation fields, for example, will receive on-the-job training from their employers once they can obtain a job.

For those who have already dropped out of school, the vocational programs in transportation in the secondary schools can leave a door open, to give such individuals a second chance. Cooperative work-study programs related to the semi-skilled motor vehicle occupations offer promising prospects for motivating both in-school and out-of-school young persons to extend their education while also participating in the work world and receiving job training. Work-study programs assist in crystallizing career decisions because students are exposed to actual employment situations. The earnings from work help meet the financial needs of students who otherwise would frequently be tempted to leave school for jobs yielding meager earnings.

At present, there are no cooperative work-study programs in the transportation occupations. In view of the large number of openings which are anticipated, planning in vocational-technical education should include research and demonstration projects aimed at developing curricula and instructional methods as a prelude

to introducing the programs. The experience in the initial programs could provide a basis for devising more effective methods for teaching job skills, general education, and an orientation to the world of work to hard-to-reach segments of the population. A valuable side effect of these programs would be their contribution to reducing the social tensions which are so marked in the inner cities.

PRIORITIES FOR VOCATIONAL-TECHNICAL EDUCATION

The estimates presented of career opportunities in transportation and their implications for the vocational education system are based on an evaluation of the recent changes in this sector of the economy. The developments in the 1970's will grow out of these changes, and they will also reflect the priorities assigned to objectives in transportation in the coming decade. It is reasonable to anticipate continuing rapid growth in automobile ownership, in other forms of motor vehicle transport, in containerization, and in air passenger and cargo transportation. The degree to which the many advances in technology which are now technically feasible become translated into new or radically changed modes of transportation in everyday use will, of course, affect manpower requirements in a number of occupations. Yet the prospects are that the influences stemming from these sources are unlikely to significantly change the magnitudes represented by the projections of job openings. The major consideration underlying this anticipation is that the types of transportation which dominate manpower needs, automobiles and trucks, are the ones least likely to be affected by far-reaching technological changes in the coming decade.

Training students for the more skilled trades in transportation, while also preparing large numbers of persons for semi-skilled positions for which training has been primarily on-the-job in the past suggests an agenda of priorities for vocational-technical education in the 1970's. They are as follows:

1. The growth anticipated in job opportunities for automobile and airplane mechanics and repairmen indicate that vocational programs in these fields should be substantially expanded.

2. Special emphasis on expanding junior and community college programs in the skilled transportation crafts such as mechanics and repairmen would raise the quality of instruction in increasingly complex fields, widen student choices, and introduce greater elements of flexibility in avoiding manpower bottlenecks.

3. Cooperative work-study programs in semi-skilled fields, e.g., truckdrivers or deliverymen and routemen, should be introduced in the secondary schools as a means for preparing many more in-school and out-of-school youth, often from disadvantaged groups, for employment in these occupations.

4. Strong vocational counseling programs and placement assistance after graduation are essential ingredients in planning effective vocational education programs in the transportation occupations.

5. Planning in vocational education for the semi-skilled transportation fields should include a greater recognition of the potentials of these programs in providing an orientation to work and in teaching problem-solving skills to non-verbal students.

Appendix Table 1

Estimated Employment by Broad Occupational Group in Occupations Associated with Transportation, 1962 and Projected 1975(a)

Occupational Category	Number Employed (in 000)		Percent of Total	
	1962	Projected 1975	1962	Projected 1975
White Collar Workers	2,309	3,554	24.9 %	24.9 %
Blue Collar Workers	6,631	10,285	71.5	71.9
Service Workers	283	417	3.1	2.9
Farm Occupations	52	48	0.5	0.3
Total	9,273	14,304	100.0	100.0

(a) Includes employment generated by the production and maintenance of transportation equipment and facilities, in research and development related to transportation, and in transportation operations and service.

Source: Lecht, Leonard A., Manpower Needs for National Goals, op. cit., p. 95.

Appendix Table 2

Employment Growth and Attrition as Sources of Job Openings in Selected Transportation Occupations, 1966 to 1975(a)

Occupational Category	Projected Average Annual Job Openings 1966 to 1975		
	From Employment Growth	Due to Attrition	Total
Motor Vehicle Occupations	199,700	58,700	258,400
Auto Mechanics & Repairmen	37,500	12,600	50,100
Auto Service & Parking Attendants	37,400	5,800	43,200
Bus Drivers	2,300	2,500	4,800
Deliverymen & Routemen	55,900	12,000	67,900
Taxidrivers & Chauffeurs	3,800	2,400	6,200
Truck & Tractor Drivers	62,800	23,400	86,200
Air Transport Occupations	10,500	2,200	12,700
Airplane Mechanics	6,900	1,700	8,600
Airplane Pilots & Navigators	3,600	500	4,100
Railroad Occupations	2,700	5,000	7,700
Brakemen & Switchmen	2,200	2,200	4,400
Locomotive Engineers	500	2,800	3,300
Total	212,900	65,900	278,800

(a) Job openings equals employment growth plus replacement needs due to attrition. The attrition rates were derived from the Labor Department source cited below.

Sources: Leonard A. Lecht, Manpower Requirements for National Objectives in the 1970's, National Planning Association, Wash., D.C., 1968, pp.258-62; 1966 Current Population Survey (unpublished); U.S. Department of Labor, Occupational Employment Patterns for 1960 and 1975, Bulletin No. 1599, Appendix D, pp. 182-3; U.S. Department of Labor, Tomorrow's Manpower Needs, Bulletin No. 1606, Vol. 1, pp. 64-67.

Appendix Table 3

Estimated Annual Job Openings and Training Programs by Selected Occupational Category, Transportation Trades
(in thousands)

Occupational or training category	Average annual job openings, 1966 - 1975	Completions of secondary and post-secondary vocational programs eligible for federal funds, FY 1967	Completions of MDTA programs, FY 1967		Other principal training programs in probable order of importance
			Institutional	On-the-job training	
Mechanics & repairmen, automobile, total	50.1	33.3	6.8	1.3	On-the-job experience, private trade schools, military service, factory training centers, short training sessions in local shops and adult vocational (public) programs for mechanics in the labor force
Mechanics		25.2			
Automotive industries		3.2			
Body & fender		3.7			
Specialization		.2			
Other automotive industries		1.0			
Airplane mechanics, total	8.6	2.3	--	--	Company apprenticeship and training courses (est. completions in FY 1967: 2.6) Private vocational schools (est. completions in FY 1967: 1.8), Four- and two-year colleges, military service
Aircraft maintenance		1.3			
Aircraft operations		.7			
Ground operations		.3			
Aviation occupations		.1			
Airplane pilots and navigators	4.1	.2	--	--	FAA-approved private flying schools in four- and two-year colleges, military service, company orientation and instruction courses

Sources: U.S. Office of Education, "Technical Education - FY 1967," and "Trades and Industrial Education - FY 1967" (unpublished data); U.S. Department of Health, Education and Welfare, Education and Training, 1969 Report of the Secretary of Health, Education and Welfare to Congress on the Manpower Training and Development Act, Statistical Tables C-1 and C-2, p. 83-84; U.S. Department of Labor, Manpower Report of the President - January, 1969, Technical Appendix, Section F, Table F-2, p. 238; U.S. Federal Aviation Administration, FAA Statistical Handbook 1967, and information received on the telephone from the FAA.

Appendix Table 4

Enrollments in Federally Funded Vocational Education Programs Directly Related to Transportation Occupations, FY 1967 (in thousands)

Education Category	Total	Secondary	Post-secondary	Adult	Special Needs
Mechanics & Repairmen, Automobile, Total	136	72	18	42	3
Mechanics	103	53	15	32	3
Body & Fender	16	8	3	4	(a)
Automotive Industries	12	9	(a)	2	(a)
Specialization	2	(a)	(a)	2	(a)
Other	3	2	(a)	1	(a)
Airplane Mechanics, Total	28	5	5	18	(a)
Aircraft Maintenance	18	2	4	13	(a)
Aircraft Operations	6	3	(a)	3	-
Ground Operations	3	(a)	1	1	-
Aviation Occupations	2	(a)	(a)	1	(a)

(a) Fewer than 500.

Sources: U.S. Office of Education, "Technical Education, FY 1967", and "Trades and Industrial Education, FY 1967" (unpublished data).